

Congestion Management Process for the Mid-Hudson Valley Transportation Management Area

January 2019

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Disclaimer

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Title VI Statement

The Dutchess County Transportation Council (DCTC), Orange County Transportation Council (OCTC), and Ulster County Transportation Council (UCTC) are committed to compliance with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, and all related rules and statutes. DCTC, OCTC, and UCTC assure that no person or group(s) of persons shall, on the grounds of race, color, age, disability, national origin, gender, or income status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under all programs, services, or activities administered by the DCTC, OCTC, and UCTC whether those programs and activities are federally funded or not. It is also the policy of the DCTC, OCTC, and UCTC to ensure that their programs, policies, and other activities do not have disproportionate adverse effects on minority and low-income populations. Additionally, the DCTC, OCTC, and UCTC will provide meaningful access to services for persons with Limited English Proficiency.

ADOPTION OF THE POUGHKEEPSIE-NEWBURGH NY-NJ URBANIZED AREA-TRANSPORTATION MANAGEMENT AREA (TMA) CONGESTION MANAGEMENT PROCESS (CMP)

WHEREAS, the Dutchess Transportation Council (DCTC), Orange County Transportation Council (OCTC), and Ulster County Transportation Council (UCTC) have been designated by the Governor of the State of New York as the Metropolitan Planning Organizations (MPOs) responsible, together with the State, for the comprehensive, continuing, and cooperative transportation planning processes for their respective counties of the Poughkeepsie-Newburgh NY-NJ Urbanized Area; and

WHEREAS, the federal surface transportation programs that are the responsibility of the DCTC, OCTC, and UCTC are authorized by the Fixing America's Surface Transportation (FAST) Act (Pub. L. 112-141, December 4, 2015); and

WHEREAS, the Metropolitan Transportation Planning Final Rule (23 CFR 450.322) requires that a TMA address congestion management through a process that provides for the safe and effective management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy; and,

WHEREAS, the development of a Congestion Management Process (CMP) should result in multimodal system performance measures and strategies that can be reflected in the Metropolitan Transportation Plan and Transportation Improvement Program; and

WHEREAS, in 2005 the DCTC, OCTC and UCTC completed their first CMP, which established a four-step process to define, measure, and manage congestion, and then evaluate its effectiveness; and

WHEREAS, in 2006 the DCTC, OCTC and UCTC completed a follow-up CMP report that identified congested roads in the three-county region based on the results of their respective travel demand models; and

WHEREAS, in 2011 the DCTC, OCTC and UCTC completed travel time surveys of major highways to more accurately identify congested roads for the CMP; and

WHEREAS, in 2018, based on the results of the TMA's Federal Certification Review and the availability of wireless travel time data, the DCTC, OCTC and UCTC initiated a major update of the CMP, using a work plan approved by the Federal Highway Administration and Federal Transit Administration; and

WHEREAS, staff of the DCTC, OCTC and UCTC have worked together on the development of CMP strategies and performance measures as documented in the Draft Mid-Hudson Valley CMP Report dated January 2019; and

WHEREAS, the updated CMP now includes a new mission statement and five objectives: 1) analyze highway congestion, 2) analyze highway travel time reliability, 3) analyze freight congestion and reliability, 4) analyze transit congestion and reliability, and 5) evaluate multi-modal accessibility; and

WHEREAS, the updated CMP establishes new performance measures related to highway congestion, freight congestion, and transit congestion; and

WHEREAS, the updated CMP includes a four-part analysis to locate congestion, using macro-level screening and then micro-level analyses for the TMA as a whole and the individual counties; and

WHEREAS, the DCTC, OCTC and UCTC will complete subsequent Technical Memoranda to the CMP, describing the results of its analysis to locate congestion; and

WHEREAS, the DCTC, OCTC and UCTC will continue to refine the updated CMP as data improves and new methods of analysis are developed; now therefore be it

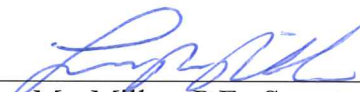
RESOLVED, that the DCTC agrees to the program strategies and measures identified in the CMP; and be it further

RESOLVED, that the DCTC agrees to work cooperatively in the development of supporting Technical Memoranda that will report and document measures of congestion as data becomes available; and be it further

RESOLVED, that the DCTC understands that not all adopted CMP strategies may be applicable in all portions of the TMA and are subject to evaluation and refinement.

CERTIFICATE, the undersigned, duly qualified and Secretary of the DCTC, certifies that the foregoing is a true and correct copy of a resolution adopted at a meeting on February 26, 2019.

2/26/19
Date

By 
Lance MacMillan, P.E., Secretary
Dutchess County Transportation Council

1. Introduction

What is a CMP?

Federal law requires that a Metropolitan Planning Organization (MPO) located within a Transportation Management Area (TMA) establish a Congestion Management Process (CMP). The CMP institutes a process for defining, identifying, managing and evaluating congestion throughout the region's transportation network.

A TMA is a federal designation used to classify Urbanized Areas with populations of 200,000 or more. The Mid-Hudson Valley TMA is based on the Poughkeepsie-Newburgh NY-NJ Urbanized Area, which includes portions of Dutchess, Orange, and Ulster counties, as well as Passaic County, New Jersey, covering a population of over 423,000 people (see Figure 1). The MPOs from the three New York counties work together to manage the TMA, and coordinate with the North Jersey Transportation Planning Authority (NJTPA) as needed.

Mid-Hudson Valley TMA CMP History

In 2005, the three MPOs of the Mid-Hudson Valley TMA – the Orange County Transportation Council (OCTC), Dutchess County Transportation Council (DCTC), and Ulster County Transportation Council (UCTC) – adopted a single CMP for the TMA. The 2005 CMP outlined a number of action items in a four-step process:

1. Measure and Define;
2. Locate;
3. Manage; and
4. Integrate and Evaluate

The first step included using volume to capacity (v/c) ratios, which measure congestion from the standpoint of supply and demand, to define and measure congestion in the short-term, and exploring the use of travel time surveys in the longer-term.

In 2006, the TMA produced a Step 2 report, which listed and mapped congested roadway segments in each county based on the v/c ratios produced by each MPO's travel demand model for the weekday peak hour (defined as 4-5 pm). The Step 2 report described the next step (managing congestion) to include identifying and promoting project-based solutions through each MPO's Transportation Improvement Program (TIP). It was determined that v/c ratios present some limitations because they do not fully account for speed variations, maneuverability, or travel time.

In 2011, the TMA completed a Travel Time Survey to address the limitations of v/c ratios and capture the important element of travel time reliability, as suggested by the 2005 CMP and the 2006 Step 2 report. Consultants drove key corridors multiple times during various time periods (am, off-peak, pm, Saturday, and Sunday) and collected GPS-based location and speed data. Congestion was measured based on the travel time index (TTI)—the ratio of peak-period travel

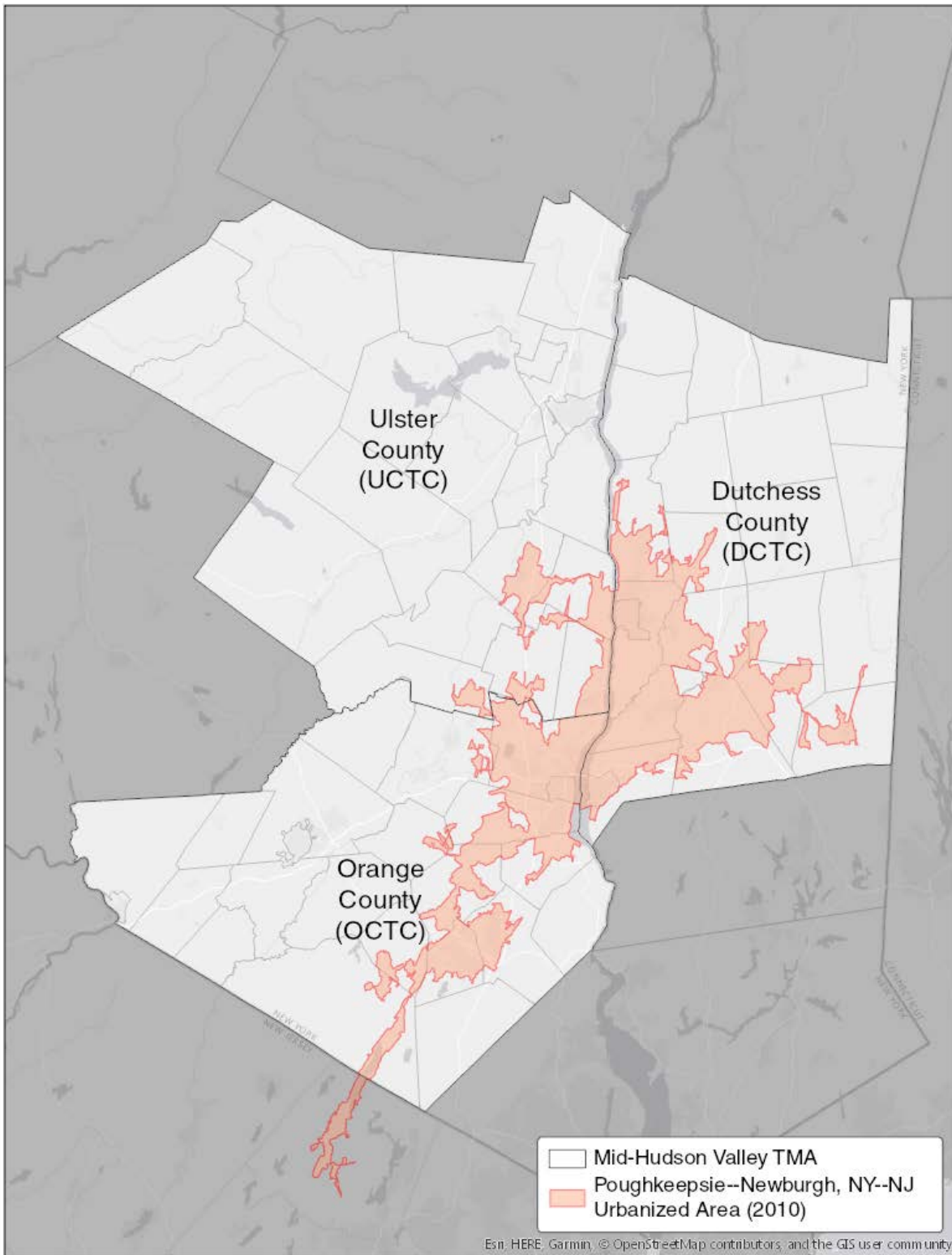


Figure 1: Mid-Hudson Valley TMA

time to free-flow travel time (defined as travel time if driving at the posted speed limit). A TTI over 1.30 was considered congested. The report included maps and tables showing the TTI by roadway segment and time period, as well as maps and charts showing average speed profiles, average travel time profiles, and box-whisker speed plots.

Purpose of 2018 Update

This 2018 CMP updates the original 2005 report based on new data, tools, and best practices, particularly those related to the [National Performance Management Research Data Set \(NPMRDS\)](#). As part of establishing the Highway Performance Monitoring System, the Federal Highway Administration contracted with two companies (HERE from 2014 to January 2017 and INRIX from February 2017 to present) to provide real-time travel data to State and MPO organizations. The data is collected in 5-minute epochs by GPS probes from commercial vehicles, connected cars, and mobile applications.¹

The New York State Department of Transportation (NYSDOT) contracted with SUNY Albany's AVAIL Labs to create an online tool for MPOs and the State to establish performance measures based on federal requirements. NYSDOT established its first iteration of these statewide system performance measures in mid-2018; the DCTC, OCTC, and UCTC subsequently endorsed the measures in accordance with federal guidance (see Appendix A). Working with the NYS Association of MPOs Travel Demand Modeling Working Group, AVAIL Labs expanded the functionality of the tool to develop additional measures for the National Highway System at various geographic scales. We are able to use the [NPMRDS tools](#) developed by AVAIL Labs to measure and analyze congestion in much greater detail than ever before.

Staff from DCTC, OCTC, and UCTC formed a CMP sub-committee, and with various agency partners' input, identified available data and tools, CMP objectives, and corresponding performance measures.

This update includes this main document, which outlines the CMP, as well as a series of technical reports with data and analysis for each component of the process. Those reports serve as appendices to the main document.

2. CMP History & Requirements

CMP History

The CMP requirement first appeared with the enactment of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The CMP requirement remained with subsequent federal transportation bills, including TEA-21 (1998), SAFETEA-LU (2005), MAP-21 (2012), and the FAST Act (2015).

¹ See <http://inrix.com/press-releases/npmrds/>

While the FAST Act maintained the requirement for TMAs to develop a CMP, it also added an option for MPOs that serve a TMA to develop individual congestion management plans with projects and strategies to be considered in the MPO's TIP.² That plan is separate from the CMP. At this point, the Mid-Hudson Valley MPOs have chosen to focus on a regional CMP.

CMP Requirements

Requirements for a CMP are outlined in Title 23 CFR, Section 450.322 (Congestion management process in transportation management areas).³ The regulation states that "the development of a congestion management process should result in multimodal system performance measures and strategies that can be reflected in the metropolitan transportation plan and the TIP."

It notes that the level of system performance deemed acceptable may vary by the type of facility, geographic location, and time of day. The regulation states that consideration should be given to strategies that manage demand, reduce single-occupant vehicle (SOV) travel, improve transportation system management and operations, and improve service integration within and across modes.

The regulation presents six core components of a CMP:

- 1) Methods to monitor and evaluate the performance of the multimodal transportation system, identify the underlying causes of recurring and non-recurring congestion, identify and evaluate alternative strategies, provide information supporting the implementation of actions, and evaluate the effectiveness of implemented actions;
- 2) Definition of congestion management objectives and appropriate performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies;
- 3) Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions;
- 4) Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies;

² See Title 23 USC (Highways), Part 134 (Metropolitan Transportation Planning), Section (k)(3) (Congestion Management Process. Per FHWA (<https://www.fhwa.dot.gov/fastact/factsheets/metropolitanplanningfs.cfm>), "Any such plan must include regional goals for reducing peak hour vehicle miles traveled and improving transportation connections, must identify existing services and programs that support access to jobs in the region, and must identify proposed projects and programs to reduce congestion and increase job access opportunities. The FAST Act specifies certain consultation requirements MPOs must use in developing the plan. [23 U.S.C. 134(k)(3)]"

³ See <https://www.law.cornell.edu/cfr/text/23/450.322>.

- 5) Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy; and
- 6) Implementation of a process for periodic assessment of the effectiveness of implemented strategies, in terms of the area's established performance measures.

These components aside, the regulation grants MPOs significant flexibility in developing the details of a CMP. This flexibility acknowledges that each region is unique and that a locally-driven process will create better congestion management techniques. Such flexibility also allows MPOs to incorporate the latest technologies and techniques as they arise. A CMP is therefore not a static document, but an evolving process that changes with the varying challenges that face a region.

Non-Attainment Areas

In addition to these basic tenets, a CMP for a TMA located in a carbon monoxide and/or ozone non-attainment area must meet additional requirements. The requirements include:

- Federal funds may not be programmed for any project that will result in a significant increase in the carrying capacity for SOVs unless the project is addressed through a congestion management process. Exceptions include safety improvements or the elimination of bottlenecks.⁴
- The CMP shall provide an appropriate analysis of reasonable (including multimodal) travel demand reduction and operational management strategies for a corridor where an increase in SOV capacity is proposed. If the analysis shows that the needed capacity cannot be met through these strategies, then the CMP must identify strategies to effectively manage the expanded SOV facility.

Dutchess and Orange counties are part of the Poughkeepsie-Newburgh 'orphan' area for ozone, so named because it was non-attainment for ozone based on the 1997 standard, but is no longer non-attainment based on more recent standards.

Federal Certification

Federal guidelines require that a CMP be in place when a MPO undergoes a formal federal certification review – the process by which the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) evaluate a MPO's compliance with federal transportation planning requirements. After the TMA's recent (2017) certification review, FHWA and FTA required the TMA to develop an updated CMP work plan. A plan was submitted in August 2018, and in November, FTA and FHWA informed the TMA that the work plan had been accepted.

⁴ Per 450 CFR 322(e)

As in any formal MPO policy document, the Policy Boards (Executive Committees) for each of the three MPOs must approve this joint CMP. It will then be forwarded to federal agencies for final review and approval.

3. Mission Statement & Objectives

As part of this 2018 CMP update, staff reviewed the TMA's 2005 CMP mission statement to evaluate its relevance in light of new federal requirements, data availability, and an evolving transportation system. In doing so, staff determined that revisions to the 2005 mission statement were appropriate. Staff researched the latest guidance related to congestion management and reviewed mission statements from other TMAs to inform the process. Potential revisions were developed and presented to the full TMA at its May 30, 2018 in-person meeting. During that meeting, TMA members suggested changes to further refine the draft mission statement. Revisions were incorporated into the final version, which is as follows:

Mid-Hudson Valley TMA - CMP Mission Statement

Use the latest tools and data sources to define, measure, locate and analyze congestion and travel time reliability for passenger vehicles, freight, and transit in the Mid-Hudson Valley Transportation Management Area, while continuing to evaluate multi-modal accessibility. Use the results of this analysis to manage congestion and improve regional accessibility, prioritizing operational improvements and travel demand management.

Objectives

The TMA developed five objectives derived from the CMP Mission Statement. The five objectives include: 1) analyze highway congestion, 2) analyze highway travel time reliability, 3) analyze freight congestion and reliability, 4) analyze transit congestion and reliability, and 5) evaluate multi-modal accessibility. Performance measures were then chosen to evaluate each objective (see Section 5 below).

4. Understanding Congestion

Types of Congestion

Our ability to formulate viable management solutions begins with an understanding of the various forms of congestion. Congestion usually relates to an excess of vehicles on a roadway segment at a particular time, resulting in speeds that are lower than the free flow speed. Historically, congestion has been thought of in two categories: recurring and non-recurring:

- Recurring congestion occurs regularly at the same place and generally at the same time, and typically reflects an imbalance between roadway capacity and existing demand – otherwise known as a “bottleneck.” Some refer to this as volume-based congestion.

- Non-recurring congestion occurs when there are disruptions to the flow of traffic due to a crash, road construction, poor weather, or traffic from a special event (such as a county fair or holiday shopping). This is sometimes referred to as incident-based congestion. Incidents are difficult to predict, making non-recurring congestion challenging to manage.

Recently, with increasing access to GPS probe data and online tools, the way we look at congestion management has begun to change. In the past, data was often limited to peak hours, and most analyses focused on recurring congestion. With the NPMRDS data and AVAIL tool, our capacity to analyze all forms of congestion has evolved considerably.

The concept of travel time reliability, rather than travel speed, is increasingly used to describe the value of a person's time. Travel time reliability describes the variation in travel times for the same trip, either day-to-day or across different times of the day.⁵ If trip times are inconsistent, the travel time is considered unreliable. Research shows that people care more about the reliability of their travel time than the total time.⁶ Drivers often plan for slower speeds at peak periods. This type of delay is reliable, meaning that although speeds are slower, the travel time is consistent. Unreliable travel times are unpredictable, making it more difficult for travelers and shippers to plan their travel, and often leading to ineffective travel decisions that waste time and money.⁷ Travel time reliability is important for work commutes, appointments, and especially for freight delivery.

Highway Congestion

Highway congestion refers to delays on the road network that affect all vehicles. Most analyses focus on peak periods, such as the morning or evening weekday commute. Some analyze consistent congestion, comparing travel time or speeds during the peak period to non-peak periods or a threshold speed. Other analyses focus on reliability *within* a given peak period.

Freight Congestion

While freight congestion can include delays at airports, water ports, rail facilities, and on highways, in this CMP we focus on highway-based freight congestion.⁸ Approximately 97 percent of freight tonnage in New York State is transported by truck⁹, and we currently have better data for highway-related congestion (including truck-specific travel data) than for other modes. MPOs also have more purview over streets and highways than over airports, water ports, or rail facilities.

⁵ [Incorporating Travel-Time Reliability into the Congestion Management Process: A Primer](#). Federal Highway Administration. Report No. FHWA-HOP-14-034; February 2015, (p. 14).

⁶ See for example https://ops.fhwa.dot.gov/publications/tt_reliability/brochure/ttr_brochure.pdf

⁷ [Incorporating Travel-Time Reliability into the Congestion Management Process: A Primer](#). Federal Highway Administration. Report No. FHWA-HOP-14-034; February 2015. (pp. 14-15).

⁸ See https://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/congestion.htm for more information.

⁹ See [Moving Dutchess 2, Chapter 5](#), (pp. 102-103).

Freight mobility is an important part of the highway system in the Mid-Hudson Valley. Congestion affects the movement of goods and can greatly increase the cost associated with freight deliveries. Freight traffic is also a major contributor to congestion on highways (and some local roads). Trucking activity is increasing, and with it, congestion related to truck traffic, which affects all vehicles on the road. The INRIX data used in the AVAIL platform includes data from commercial vehicles and fleets and can be filtered by vehicle type (drivers self-report their vehicle type).

Transit Congestion

Given the increasing focus on multi-modal performance measures, transit congestion is also important to consider. Transit congestion can refer to crowded trains, buses, or ferries; over-capacity train station parking lots or multi-modal centers; transit reliability (on-time performance); and road congestion that affects transit vehicles. In the Mid-Hudson Valley, regional transit includes Metro-North Railroad on both sides of the Hudson River, Amtrak rail service on the east side of the Hudson, the Newburgh-Beacon Ferry, and regional bus providers. Local transit includes several local bus operators.

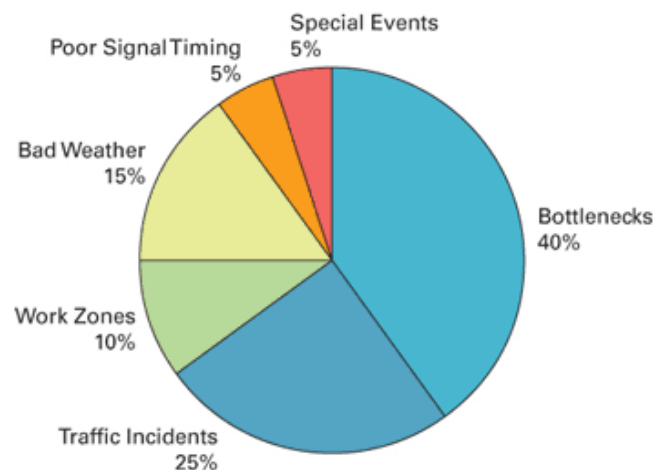
While passenger overcrowding is currently not an issue in our area, on-time performance and reliability are important to effective transit service. Transit on-time performance is affected by congestion on the roadway or transit line, as well as transit operations (passenger loading and unloading, payment, etc.).

Congested transit routes can lead to poor on-time performance and unreliability of the transit network. This is an issue because many residents and visitors rely on transit, especially vulnerable populations such as individuals and families living in poverty, older adults, and the disabled. When transit is efficient and reliable, it can provide an effective alternative to single-occupancy vehicle travel and help reduce traffic congestion. The TMA is evaluating regional transit connections as part of a Regional Transit Plan.

Causes of Congestion

As data improves, we are able to understand congestion in increasingly nuanced ways. We can analyze congestion levels by time of day, day of the week, and season, as well as with a variety of measures. Figure 2 shows the common causes of congestion.¹⁰ According to FHWA, approximately 45 percent of congestion is due to bottlenecks or signal timing, while 55 percent is due to incidents, work zones, weather, and special events. Addressing congestion related to incidents, work

Figure 2- Causes of Congestion



¹⁰ Federal Highway Administration (FHWA), Transit and Congestion Pricing webpage: https://ops.fhwa.dot.gov/publications/fhwahop09015/cp_prim7_02.htm

zones, weather and special events, traditionally thought of as ‘non-recurring’ congestion, is key to improving travel time reliability. However, the strategies chosen to address congestion will depend on the specific issues at each location.

5. Step 1 – Define and Measure

Performance Measures

The CMP is meant to provide for the safe and effective, integrated management and operation of the multimodal transportation system. Performance measures are used to assess the extent of congestion and evaluate the effectiveness of congestion reduction and mobility enhancement strategies.

The TMA selected the following performance measures to evaluate the CMP objectives related to highway, freight, and transit congestion and travel time reliability (see definitions in Table 1). These measures may change in the future based on available data and emerging best practices.

All Traffic:

- Travel Time Index (TTI) – identifies recurring peak period bottlenecks
- Total Hours of Excessive Delay per mile (TED/mile) – identifies regularly congested higher-volume road segments
- Level of Travel Time Reliability (LOTTR) – identifies road segments with highly variable congestion

Freight:

- TED/mile (for all vehicles) on State-designated Freight Routes
- LOTTR (for all vehicles) on State-designated Freight Routes
- Truck Travel Time Reliability (TTTR) – identifies unreliable road segments for trucks (evaluated for Interstates only)

Transit:

- TED/mile on transit routes (evaluated at the county level, as feasible)
- LOTTR on transit routes (evaluated at the county level, as feasible)
- Transit on-time performance (as available)

Data Quality

The extent of the analysis will be based on consistently available data. Our initial analysis will focus on the National Highway System (NHS), shown in Figure 3, and then expand to non-NHS roads as data becomes available.

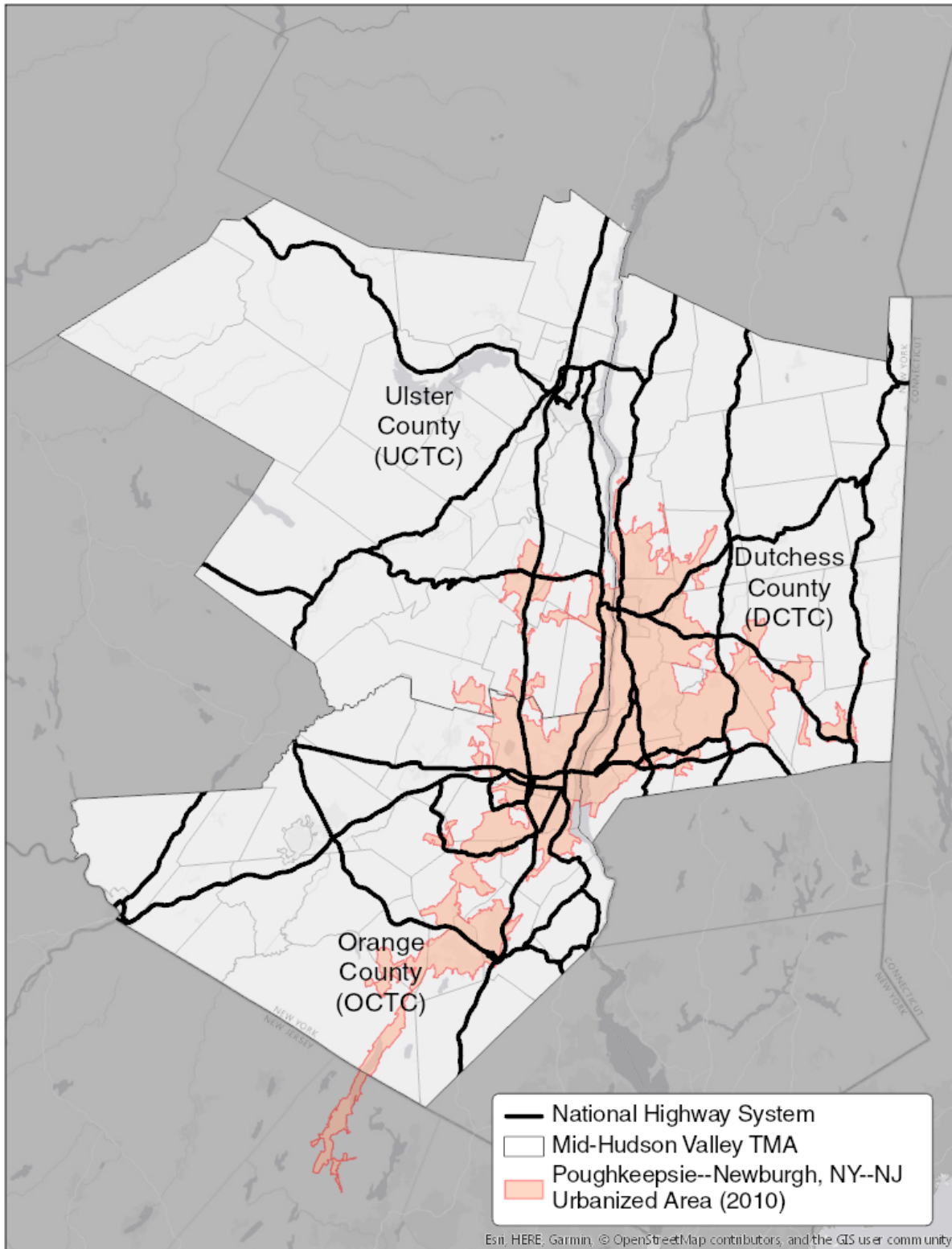


Figure 3: National Highway System in the Mid-Hudson Valley

Multi-Modal Accessibility

The availability of transportation options can alleviate network congestion by offering alternative modes of transportation, reducing single-occupant vehicle travel, and improving service integration within and across modes. The TMA will evaluate regional accessibility using the measures below (see definitions in Table 1):

- Park & Ride availability – Park & Ride lots facilitate carpooling and transit use, which can ease congestion. The TMA will evaluate the availability and use of these facilities.
- Transit availability – Transit services are a shared alternative to single-occupancy vehicles and can greatly ease congestion. Riders that use transit services may drive or bike to transit hubs. The TMA will evaluate the availability of local and regional transit services. This may be supplemented by analyses done as part of the TMA’s Regional Transit Plan.
- Bicycle networks – Bicycle networks include dedicated facilities for bicycling, such as on-road bicycle lanes and off-road shared paths. The TMA will evaluate the extent of these bicycle networks.
- Bicycle parking availability – Availability is measured by the number of bicycle parking spaces at transportation facilities and transit hubs for multiple-trip commutes. Providing space for single-occupant vehicles at such facilities can be costly, while bicycle parking is a low-cost alternative and alleviates capacity issues at high-demand transportation facilities.
- Bicycle racks on buses – Like bicycle parking availability, the availability of bicycle racks on buses provides alternatives for multiple-trip commutes that use bicycles as part of the trip. The availability of this option reduces the need to use single-occupancy vehicles.
- Pedestrian networks – Sidewalks provide non-motorized access to transit. The TMA will determine the extent of sidewalk coverage near key transit locations.

In addition, multi-modal access is part of our broader congestion management strategy (see Step 3).

Table 1: CMP Objectives and Performance Measures		
Congestion Management Objectives	Performance Measures	Definition of Measures
Analyze highway congestion	Travel Time Index - TTI	The ratio of the average travel time during the worst peak period (weekdays, either 6-9 am or 4-7 pm) to the free-flow travel time. Free flow travel time is defined as the 15 th percentile of off-peak travel times (weekdays 9 am-4 pm and 7 pm-10 pm and weekend 6 am-10 pm).
	Total Excessive Delay per mile - TED/mile (harmonic mean-based free flow)	The amount of time spent traveling below a specified threshold speed (20 mph or 60 percent of the free flow speed, whichever is greater) during all hours (weekdays and weekends). The time spent below the threshold speed is multiplied by the estimated volume on the segment during that hour. The total is divided per mile of total segment length for comparison across the network.
Analyze highway travel time reliability	Level of Travel Time Reliability - LOTTR	The ratio of the 80 th percentile travel time over the 50 th percentile travel time for the worst period (weekdays 6-10 am, 10 am-4 pm, or 4-8 pm, or weekends 6 am-8 pm). This measures the extent of unreliable travel times.
Analyze freight congestion and reliability	TED/mile on State-designated Freight Routes	TED/mile (defined above) on freight routes as designated in the New York State Freight Transportation Plan.
	LOTTR on State-designated Freight Routes	LOTTR (defined above) on freight routes as designated in the New York State Freight Transportation Plan.
	Truck Time Travel Reliability - TTTR	The ratio of the 95 th percentile travel time over the 50 th percentile travel time <i>for trucks only</i> , during the worst period (weekdays 6-10 am, 10 am-4 pm, 4-8 pm, 8 pm-6 am, or weekends 6 am-8 pm). The TMA will only apply this measure to interstates, which have the truck volume necessary for reliable results.
Analyze transit congestion and reliability	TED/mile on bus transit routes	TED/mile (defined above) on transit routes (as feasible based on available data).
	LOTTR on bus transit routes	LOTTR (defined above) on transit routes (as feasible based on available data).
	Transit on-time performance	The percentage of stops that occur within a given time of the published schedule (often 1-5 minutes). Due to the limited data available for some providers, we focus on Metro-North and some local bus service.

Evaluate multi-modal accessibility	Park & Ride availability	The number of Park & Ride spaces available and their percent occupancy during observations.
	Transit availability	The percentage of the population within a half-mile/quarter-mile of a bus stop/route or train station.
	Bicycle networks	The mileage of bike paths (including bridges that allow bicycle access) and dedicated on-street facilities (bike lanes).
	Bicycle parking availability	The number of bike parking racks and lockers at key intermodal locations (train stations, intermodal/bus hubs, park & ride lots).
	Bicycle racks on buses	The percentage of public bus systems with racks on all buses.
	Pedestrian networks	The percentage of sidewalk coverage within a half-mile/quarter-mile of key transit locations (train stations, intermodal/bus hubs, bus stops/routes, and ferry stations, as feasible based on available data).

6. Step 2 – Locate

Step two of this CMP includes a four-part analysis, with macro-level screening and then micro-level analyses for the TMA as a whole and the individual counties. Due to limitations of available data, our initial analyses will focus on the National Highway System (NHS).

Macro-Level Screening: TMA

First, we take a macro view, and look at the entire three-county TMA network. We will explore methods to quantify congestion across the TMA that enable us to compare overall congestion in future updates of the analysis. We then use the measures described above to identify the most congested or unreliable locations in the TMA for highways, freight, and transit. For transit, we focus on inter-County services, such as Metro-North Railroad, UCAT’s Ulster-Poughkeepsie Link bus, and privately-operated regional public transit routes.

Macro-Level Screening: Counties

Second, each MPO applies a similar macro approach to their county. This involves using the measures described above to identify the most congested or unreliable locations within each county. For roadways, this includes screening the entire network (based on available data). For transit, we look primarily at local, intra-county bus routes.

Micro-Level Analysis: TMA

Third, we take the results from the TMA-wide screening and analyze the worst-performing segments to better understand the underlying issues. This includes evaluating individual segments by season, day of week, and time of day, as well as looking at causal factors such as incident patterns, intersection geometry, traffic signal timing, and others. This analysis focuses mainly on roadway congestion, including locations of concern for freight and bus transit.

Micro-Level Analysis: Counties

Fourth, the MPOs take the results from the macro-level county screenings and analyze the worst-performing segments to better understand the underlying issues, using similar tools to the TMA-wide micro analysis: evaluating individual segments by season, day of week, and time of day, as well as looking at causal factors such as incident patterns, intersection geometry, and traffic signal timing. As with the TMA-wide micro-level analysis, this analysis focuses mainly on roadway congestion, including locations of concern for freight and bus transit.

The results of these analyses will be provided in separate technical reports, which will be updated regularly.

7. Step 3 – Manage

Corridor and Intersection Studies

When appropriate, we will pursue corridor and/or intersection studies at priority locations to expand on the micro-level analysis and work with stakeholders to develop recommendations for implementation. Depending on the location and issues identified, these studies could add to the evaluation of congestion with analysis of operations, safety, and multi-modal access issues.

Management Strategies

We will promote congestion management strategies for the worst-performing segments, based on the issues identified. These could include the following:

- Traffic operational improvements, such as signal timing changes, turn pockets at intersections, and access management along corridors.
- Other engineering improvements, such as roundabouts or intersection realignments.
- Demand management measures, including growth management, improved walking and bicycling infrastructure, more robust transit service, and innovative mobility options.
- Public transportation improvements, such as real-time information and transit signal priority.
- ITS technologies, such as improved incident alerts, vehicle tracking, real-time traffic feedback, and travel options information.
- Incident management, including strategies to anticipate incidents and respond more quickly, and improved work zone and special event management.

Implementation

It is important to be clear about the role that the MPOs can play in congestion management. We can analyze data, and work with partners to prioritize locations for improvement and conduct studies to develop strategies and recommendations. We can also program federal funds to support improvement projects. However, implementation of those projects rests with the road or facility owner. Because the AVAIL Labs' NPMRDS tool focuses on the NHS, most of the roads analyzed are the responsibility of NYSDOT (note: the three Hudson River crossings in the TMA are the responsibility of the NYS Bridge Authority). The TMA as a whole, as well as the individual MPOs, will work with NYSDOT and other facility owners to address congestion by

sharing our evaluation of the data, convening teams to develop recommendations, and supporting facility owners in programming projects.

Funding

Planning studies, including this CMP and future updates as well as specific intersection or corridor studies, can be funded through FHWA and FTA planning funds. The MPOs will continue to program planning funds for congestion management on our annual UPWPs.

Engineering projects to address congestion can be funded through a variety of sources, including federal NHPP, STBG, CMAQ (when available/applicable), and HSIP (for safety-related projects), as well as State-dedicated funds through NYSDOT, and FTA Section 5307 and 5339 funding for transit projects. The MPOs will work with partners to program projects on our TIPs.

8. Step 4 – Integrate and Evaluate

This CMP is intended to be a living document. It outlines a process that will continue to evolve as data improves and new methods of analysis are developed. Evaluation of the CMP is expected to include the following:

- **Assess the effectiveness of implemented strategies:** after strategies are implemented, we can re-evaluate congestion levels on the applicable facilities. ideally this would take the form of a pre-post project evaluation. Such an evaluation would also need to consider other factors, such as changing land use or travel patterns, that could influence post-project congestion levels.
- **Re-analyze worst-performing segments:** periodically, we would revisit the specific analyses outlined under Step 2. This would be done as new data and tools become available (e.g., changes to the AVAIL Labs tool, better freight data, new transit data, etc.).
- **Update the CMP:** The MPOs will update the CMP on a regular basis, coordinated with our Long-Range Plan updates. Because our LRP update schedules vary (due to air quality conformity), the update timing may vary as well. One potential schedule would be to update the TMA macro- and micro-level analyses every four years and update the County-specific macro- and micro-level analyses every four to five years, in preparation for the individual MPO's long-range, Metropolitan Transportation Plan (MTP) update. The results could then be integrated into the updated Long-Range Plan. The micro-level analyses described above under Step 2 could also be updated when new data becomes available and as needed for other studies.
- **Integrate the CMP:** The three MPOs will integrate the CMP into our core documents consistently across the TMA. This could include the following:

- **MTP/Long-Range Plan:** describe the CMP, highlight the key findings from the latest CMP, and use the results as guidance for prioritizing projects.
- **UPWP:** include corridor/intersection studies based on CMP results, as well as projects to update or refine the CMP as needed.
- **TIP Project Selection Criteria:** use the CMP results as one criterion for selecting new transportation projects in each MPO's TIP.

The MPOs will also post the CMP documents on a publicly-accessible website (either MPO websites or a shared TMA platform).

Appendix A:

Statewide System Performance Measures¹¹ (adopted in 2018)

NYSDOT Targets for System Performance Measures on the National Highway System (NHS)

NHS System Performance Targets by Level of Travel Time Reliability (LOTTR)		
Year	LOTTR Interstate	LOTTR Non-Interstate
2018 (Baseline)	81.3%	77.0%
2020	73.1%	n/a
2022	73.0%	63.4%

NYSDOT Targets for Freight Performance Measures on the Interstate System

Interstate Freight Performance Targets by Truck Travel Time Reliability (TTTR)	
Measure	TTTR
2018 (Baseline)	1.38
2020	2.00
2022	2.11

¹¹ For more information on the System Performance measure, see <https://www.fhwa.dot.gov/tpm/rule/pm3/reliability.pdf>. For more information on the Freight Performance measure, see <https://www.fhwa.dot.gov/tpm/rule/pm3/freight.pdf>.